

(in his *Systema Naturae* ed. 10. 2: 736. 1759). His entry under genus 228, *Cordia*, runs:

*Bourreria* 3. C. fol ovatis integerrimis, fl.  
subcorymbosis, calyce-laevibus. *Brown*.  
*jam.* 168. t. 15. f. 2. *Plum ic.* 105  
*Comm. amst.* 1. t. 79.

There are three elements in this: 1) a plant from Jamaica figured by Browne; 2) a plant figured by Plumier which is *Cordia sebestana* L. and must have been included by accident; 3) a plant from Curaçao figured by Commelin, *Rar. Pl. Horti. Med. Amstelod.* 1: 153. t. 79. 1697, as *Mespilus Americana lauri-folia glabra*. The lectotype of *Cordia bourreria* must obviously be Browne's Jamaican plant, represented by Linnaean Herb. 254.2.

This Linnaean specimen from Browne has closely appressed minute gray hairs covering the inflorescence and the calyx and also the underside of the leaf; it represents a species common in Jamaica which Miers described in 1869 under *Crematomia molliuscula* and other names. Linnaeus in 1762 (*Sp. Pl.* ed. 2. 1: 275) transferred this from *Cordia* to *Ehretia* as *E. Bourreria*.

In 1838, in his *Sylva Telluriana Mantissa Synoptica*, Rafinesque published a nomenclaturally important note on *Bourreria* as follows: "203. BOURRERIA Br. Jaq. Ad. Kunth, &c, dif. Ehretia, cor. hypocrat. tubo elong. limbo plano lac. dilatatis vel obcord. drupis 4gonis, 4sulcat. nucibus 2 utrinque 2 sp. fl. corymbosis. To this belong *B. baccata* (E. Bour. L.) and *B. exsucca* Jaq. Perhaps some others, more like some *Cordias* than *Ehretias*." Rafinesque's new name *B. baccata*, being based on *Ehretia bourreria* (L.) L., necessarily has the same type, i.e. *Cordia bourreria* L., and is thus the earliest specific name available for the Jamaican *Bourreria* with appressed pubescence. This species is accordingly the type species of *Bourreria* P. Browne.

Familiar with *Cordia*, *Bourreria*, and *Ehretia* in a living state which he saw while in the Caribbean region from 1755–1759, Jacquin accepted the genus *Bourreria* in 1760 (*Enum. Syst. Pl. Carib.* 2, 14), but provided a generic diagnosis of his own, "*Bacca* 4-sperma. *Sem.* 2-locularia. *Cor.* hypocrateriformis," and also diagnoses of two new species:

*succulenta* 1. BOURRERIA fructibus succulentis.  
*Comm. Amst. t.* 79.  
*exsucca* 2. ——— fructibus exsuccis.

In 1763 (*Select Stirp. Amer.* 44) under the emended name *Beurreria*, Jacquin gave detailed descriptions based on living material examined in Martinique and Curaçao for *B. succulenta* and at Cartagena, Colombia, for *B. exsucca*. Neither name was based on Jamaican material, although Jacquin in 1763, but not in 1760, cited synonyms of Browne and Sloane referring to Jamaican plants. Since Jacquin figured a specimen from



Martinique, in his *Observ. Bot.* t. 26. 1767, as representing his *B. succulenta*, Martinique can be accepted as its restricted type locality.

In 1869 John Miers, at the age of 79, published a survey of *Bourreria* which he divided into two genera, i.e. *Bourreria* proper and *Crematomia*, typified by *B. exsucca*. This appeared in *Ann. Mag. Nat. Hist.* IV. 3: 199–210, 300–313. [Mar.-Apr.] 1869, and was reprinted in his *Contributions to Botany* 2: 230–242. He was an acute and accurate observer, who retained into old age an intense curiosity about morphological details which he investigated with assiduity, and as a retired chemist and engineer, he brought to his botanical studies the precision of his former callings, together with a somewhat mechanical approach. As William Carruthers remarked in his obituary of Miers (*Jour. Bot.* (London) 18: 36. 1880), "he had a very quick sense of differences, but he sometimes failed to distinguish the real value of the differences he saw." The editor, M. T. Masters, of the *Gardeners Chronicle* (cf. 1879. 2: 522. [Oct.] 1879) said much the same: "as a botanist his tendency was to minute elaboration rather than judicial estimate of the relative importance of details. In practice, therefore, he multiplied species, and even genera and orders, to an extent opposed to the prevailing tendencies of his contemporaries. Miers never adopted the doctrine of the mutability of the species"; he was 70 when Darwin published *The Origin of Species*. Seemingly he took as representing a well-marked species any herbarium specimen or little group of herbarium specimens which differed in appearance from other specimens. Thus, on the evidence of sixteen specimens in the British Museum and Kew herbaria, he recorded nine taxa from Jamaica under the names *Bourreria succulenta*, *B. ovata*, *B. rigida*, *B. tomentosa*, *Crematomia venosa*, *C. attenuata*, *C. elongata*, *C. molliuscula*, *C. velutina*, these being described accurately but defined vaguely. O. E. Schulz in 1911 reduced them all to three, *B. succulenta*, *B. velutina*, and *B. velutina* var. *venosa*. The variability within populations in the genus, particularly as regards leaf shape, is so great that only a few inconspicuous inflorescence and floral characters seem constant enough over large areas to serve for the distinction of taxa. Thus the character separating *B. succulenta* from its allies is its undivided style, to which Schulz attached much importance and which certainly seems unvarying in the material available over most of the West Indies. In Jamaica, however, there are rather similar plants but with the style deeply divided. For these the name *B. venosa* is used here, although with some doubt as to the importance of the distinction. Four Jamaican taxa, closely allied, may be distinguished as follows:

1. Inflorescence and outside of calyx covered completely with short whitish hairs visible under a lens.
  2. Hairs of inflorescence and calyx appressed. Widespread. . . . 1. *B. baccata*.
  2. Hairs of calyx erect or spreading. St. Catherine. . . . . 2. *B. velutina*.
1. Inflorescence and outside of calyx glabrous or, rarely, with a few scattered hairs.
  3. Style divided into two branches 1–2.5 mm. long, hence with two stigmas each about 1 mm. broad. Widespread. . . . . 3. *B. venosa*.



3. Style not divided but grooved at apex, hence with one bilobed stigma 1–2 mm. broad. St. Andrew. . . . . 4. *B. succulenta*.

1. *Bourreria baccata* Raf., Sylva Tellur. 42. 1838. FIGURES 1E; 2A.

*Bourreria arborea foliis ovatis alternis* P. Browne, Civil & Nat. Hist. Jam. 168. t. 15. f. 2. 1756.

*Cordia bourreria* L. Syst. Nat. ed. 10. 2: 936. 1759, sensu stricto.

*Ehretia bourreria* (L.) L. Sp. Pl. ed. 2. 1: 275. 1762.

*Bourreria rigida* Miers, Ann. Mag. Nat. Hist. IV. 3: 204. 1869; Miers, Contrib. Bot. 2: 236. 1869.

*Crematomia elongata* Miers, tom. cit. 308. 1869; Miers, Contrib. Bot. 2: 250. 1869.

*Crematomia molliuscula* Miers, tom. cit. 309. 1869; Miers, Contrib. Bot. 2: 252. 1869.

*Beureria velutina* sensu O. E. Schulz in Urban, Symb. Antill. 7: 62. 1911, maj., non (DC.) Gürke.

Evidently widespread in Jamaica, where it ranges from sea-level to 3000 ft. (900 m.), this has been collected in the parishes of ST. JAMES (*Stearn 615*); TRELAWNY (*West & Arnold 782*); MANCHESTER (*Howard & Proctor 14328*); CLARENDON (*Proctor 10219*; *Proctor 8215*; *Lewis 2851*); ST. ANN (*Alexander 564*); ST. CATHERINE (*Harris 6763*); ST. ANDREW and KINGSTON (*McNab*; *Campbell 5774, 6151*; *Harris 11774*; *Webster 4996*; *Yuncker 17066, 18149*).

I have taken as the lectotype of *Bourreria baccata* Raf. a specimen from P. Browne in the Linnaean Herbarium 254.2 (LINN), of *B. rigida* Miers one from *Houstoun* (BM), of *Crematomia elongata* Miers one from *Bancroft* (K, BM; drawing of K specimen by Miers), of *C. molliuscula* Miers one from McNab collected near Halfway Tree (K, BM; drawing of K specimen by Miers).

2. *Bourreria velutina* (DC.) Gürke in Engler & Prantl, Pflanzenfam. IV. 3a: 1893, as "Beureria"; O. E. Schulz in Urban, Symb. Antill. 7: 62. 1911, pro parte min. FIGURES 1E; 2B.

*Ehretia velutina* DC. Prodr. 9: 508. 1845.

*Crematomia velutina* (DC.) Miers, Ann. Mag. Nat. Hist. IV. 3: 310. 1869; Miers, Contrib. Bot. 2: 252. 1869.

Small tree or shrub to 4 m. high; younger branchlets puberulous with soft whitish erect or ascending hairs to 0.5 mm. long, older ones glabrous and gray. *Leaves* scattered or crowded, variable in shape and size on the same plant; blade oblong-elliptic, broadly elliptic, oblanceolate or obovate, with the apex usually rounded or obtuse, rarely subacute, margin entire, base narrowly or broadly cuneate, 2–9 cm. long, 1.5–4 cm. broad, with 6–8 pale curved nerves each side of the midrib connected by a fine slightly raised network of veinlets, strigulose above with short almost appressed hairs, puberulous below with short soft ascending hairs especially along the midrib and nerves, chartaceous; petiole 3–9 mm. long, puberulent.



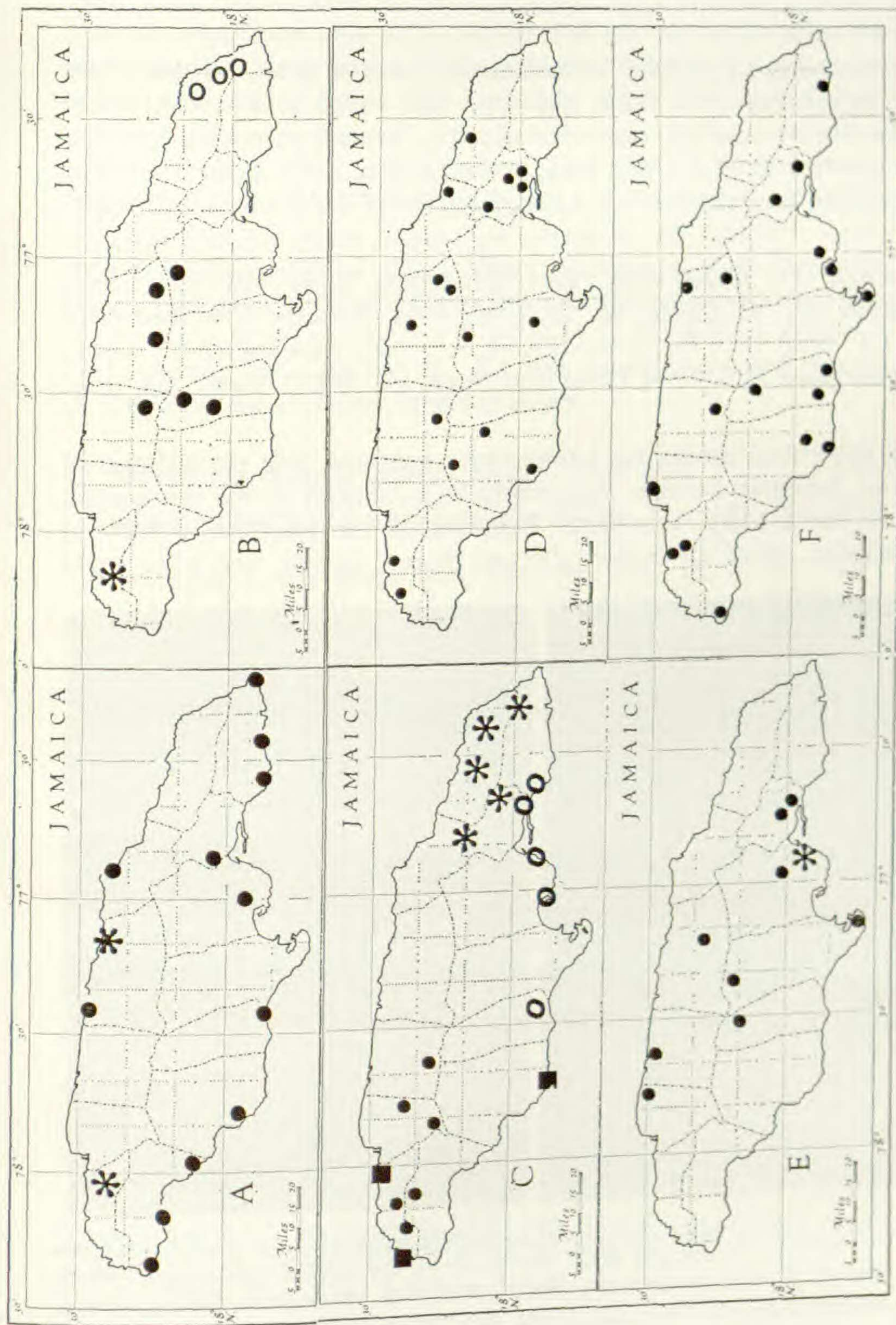


FIGURE 1. Maps showing distribution of species in Jamaica. A. *Tabernaemontana laurifolia* (dots); *T. glaucescens* (stars). B. *Tabernaemontana ovalifolia* and *T. ochroleuca* (star); *T. wulfschlaegelii* (dots). C. *Tournefortia astrotricha* var. *subglabra* (squares); *T. astrotricha* var. *glabra* (circles). D. *Tournefortia hirsutissima* (dots). E. *Bourreria baccata* (dots); *B. velutina* (star). F. *Bourreria venosa* (dots).



*Inflorescence* terminal, loosely corymbose, 6–20-flowered, completely puberulous with soft erect hairs to 0.5 mm. long. *Calyx* at anthesis narrowly campanulate, about 6–7 mm. long, with acute teeth 1.5–2 mm. long, completely puberulous like the inflorescence with soft erect hairs, in fruit outspread and deeply divided with the teeth 3–4 mm. long. *Corolla* white when fresh, brown when dried, glabrous; tube about 6 mm. long; lobes broadly obovate, rounded, about 4 mm. long. *Stamens* exserted; filaments above insertion about 2.5 mm. long, anthers 2 mm. long. *Style* divided at the apex into two branches 0.5–1 mm. long. *Fruit* 7–10 mm. in diameter, red.

**Jamaica.** ST. CATHERINE: Port Henderson, Lane 423 (K). Port Henderson Hill, 50–250 ft., vii. 1958, vii. 1954, Webster & Wilson 4930 (BM; IJ). Near Port Henderson, 250 ft., xi. 1957, Yunker 17477 (BM); Port Henderson Hill, E. of Great Salt Pond, vii. 1958, Powell 558 (BM; IJ).

This puberulous species has hitherto been confused with the widespread sericeous *Bourreria baccata*. Apparently it is confined to the low coastal scrub on the hot dry “dog-tooth” limestone of the Healthshire Hills of St. Catherine, which the earlier collectors Sloane, Bertero, and Lane could

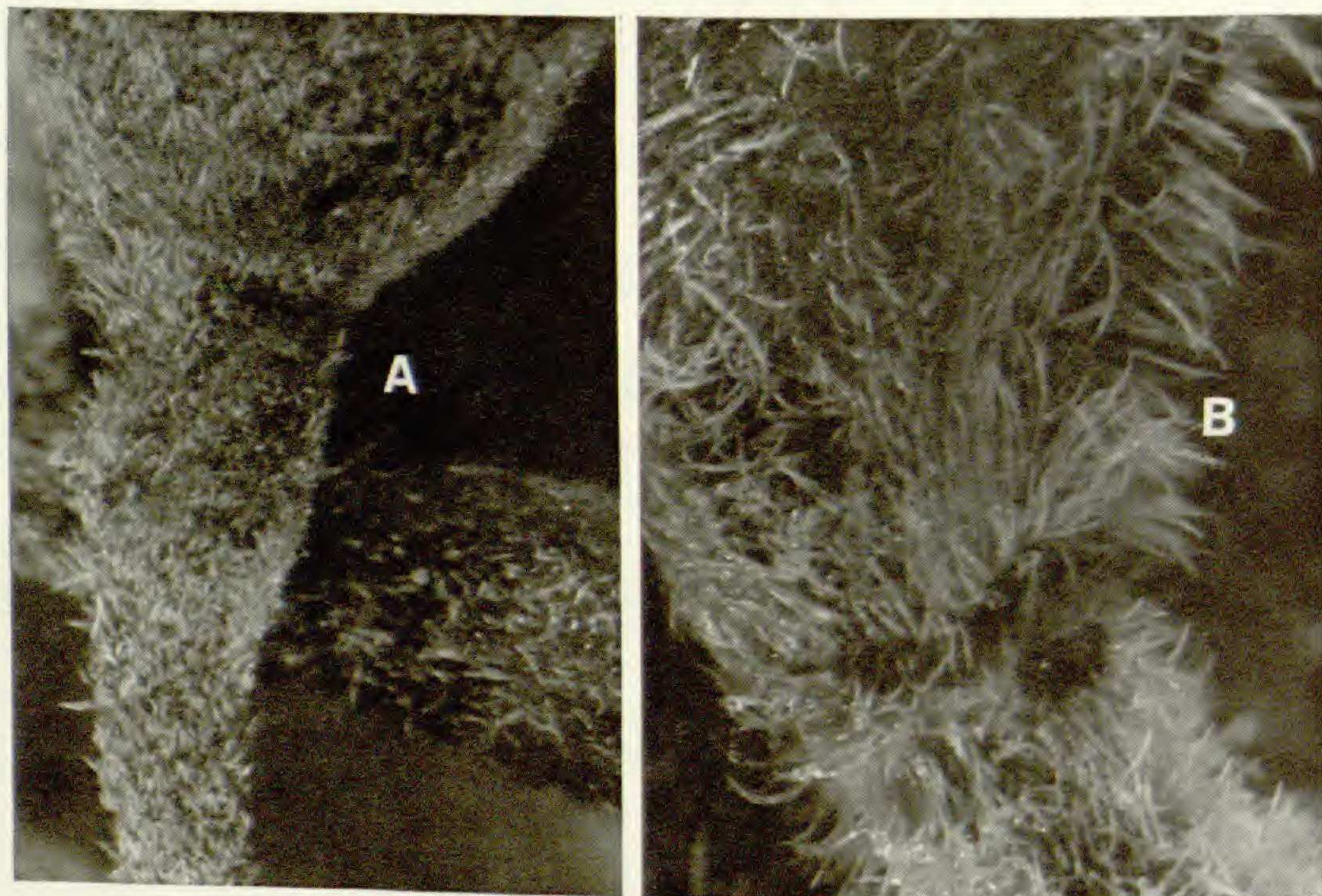


FIGURE 2. Photographs showing characteristic pubescence in species of *Bourreria*,  $\times 40$ . A. *B. baccata* Raf., hair-covering of pedicel and calyx (from lectotype, P. Browne in Linnaean Herb. 245.2); B. *B. velutina* (DC.) Gürke, hair-covering of pedicel and calyx (from Webster & Wilson 4930, BM).

easily have reached by boat from Port Royal. The earliest gathering is in Sloane's herbarium vol. 7, fol. 36, lower specimen (BM), collected between December 1687 and March 1689. De Candolle described it in



1845 as *Ehretia velutina* from a specimen collected in Jamaica by Bertero. As his description would also apply to the closely related *B. baccata*, Dr. Werner Greuter kindly examined the type specimen for me in the De Candolle Prodromus Herbarium at the Conservatoire botanique, Geneva, and compared it as regards pubescence with modern Jamaican material of both taxa. He reports that "the type of *Ehretia velutina* has patent hairs on both calyces and pedicels. The type specimen is in complete agreement with some specimens from the Port Henderson area in our herbarium and especially with Yuncker 17477." This establishes conclusively that the name *B. velutina* belongs to the extremely local species with spreading hairs of which Miers published a good description from Lane's Port Henderson specimen under the name *Crematomia velutina* and not to the widespread species (*B. baccata*) to which other authors, notably O. E. Schulz, have applied it. For this reason a detailed description of *B. velutina*, sensu stricto, is given above.

3. *Bourreria venosa* (Miers) Stearn, comb. nov.

FIGURE 1F.

*Jasminum periclymeni folio, flore albo* Sloane, Voy. Jam. Nat. Hist. 2: 96. t. 204, f. 1. 1725.

*Crematomia venosa* Miers, Ann. Mag. Nat. Hist. IV. 3: 305. 1869; Miers, Contrib. Bot. 2: 248. 1869.

*Beureria velutina* var. *venosa* (Miers) O. E. Schulz in Urban, Symb. Antill. 5: 63. 1911.

Also widespread in Jamaica, *Bourreria venosa* ranges from sea-level to 3000 ft. (900 m.) and has been collected in the parishes of HANOVER (*Britton* 2252; *Proctor* 23906; *Stearn* 146); WESTMORELAND (*Harris* 10236; *Britton & Hollick* 2069, 2074); ST. JAMES (*Proctor* 23075); ST. ELIZABETH (*Britton* 1200; *Harris* 9703, 9806; *Stearn* 1034; *Webster & Proctor* 5326); TRELAWNY (*Harris* 8788; *Howard & Proctor* 14164; *Proctor* 14658; *Proctor* 24488; *Robbins* 127; *Webster, Howard, Proctor & Stearn* 14658; *Proctor* 24488; *Robbins* 127; *Webster, Ellis, & Miller* 8388); MANCHESTER (*Adams* 9843; *Harris* 8239; *Proctor* 10590); ST. ANN (*Harris* 8981, *Prior*); CLARENDON (*Lewis* 5025; *Webster* 5112); ST. CATHERINE (*Lewis* 8937; *Yuncker* 17357); ST. ANDREW (*Newill* 2795; *Proctor* 10209); and ST. THOMAS (*Webster & Wilson* 4824). It also occurs in the Cayman Islands on GRAND CAYMAN (*Brunt* 1715, 2069; *Kings GC* 310), LITTLE CAYMAN (*Proctor* 28149) and CAYMAN BRAC (*Proctor* 29032).

The type of *Bourreria venosa* is an unlocalized specimen collected in Jamaica by R. C. Alexander in 1850 (κ; drawing by Miers of κ specimen is in BM); a duplicate of this, in the personal herbarium retained by him but bequeathed to Kew in 1903, is labeled "Ocho Rios": hence, Ocho Rios, on the coast of St. Ann, is the type locality. It should be noted that Dr. Richard Chandler Alexander (1809–1902), who collected in Jamaica in 1849 and 1850, took the surname of Prior in 1859 on the death of a relative and his Jamaican collections are sometimes cited as those of Alexander, sometimes of Prior.



4. *Bouerreria succulenta* Jacquin, Enum. Syst. Pl. Carib. 14. 1760;  
O. E. Schulz in Urban, Symb. Antill. 7: 55. 1911.

*Mespilus americana laurifolia glabra fructu rubro mucilaginoso* Commelin,  
Hortus Med. Amstel. 1: 153. t. 79. 1697.

The only localized Jamaican gatherings referable to *Bouerreria succulenta* were collected in St. Andrews Parish at the Grove on a rocky hillside at 750–800 ft. (200–240 m.) by Harris (5760, 12084) and these may possibly belong to an aberrant form of *B. venosa* in which the style branches have failed to separate. The species is recorded from Cuba, Hispaniola, Puerto Rico, St. Croix, St. Martin, Barbuda, Antigua, Guadeloupe, Dominica, Martinique (locus classicus), St. Lucia, St. Vincent, Grenada, Barbados, Tobago, and Curaçao.

## BORAGINACEAE

### CORDIA section VARRONIA IN JAMAICA

*Cordia* section VARRONIA (P. Browne) G. Don, Gen. Syst. Garden. Bot. 4: 382. 1837, consists of shrubs with small flowers clustered in dense heads or spikes. Its members in the West Indies, Mexico, and Central America south to Venezuela are the subject of a critical and detailed revision by Ivan M. Johnston, published in the *Journal of the Arnold Arboretum* 30: 85–104. 1949, in which he distinguished 16 species. In 1950 (op. cit. 31: 177–179) he added two more, both Jamaican. The few departures from Johnston's conclusions, as below, are not meant to diminish their value as a whole; Johnston's scholarly studies of tropical American Boraginaceae have provided a sound basis for all later work on the taxonomy and the nomenclature of the family.

The following is a synopsis of the Jamaican species.

1. Inflorescence cylindric, 1.5–3.5 cm. long.
  2. Leaves densely hairy on lower side. Calyx with evident short stiff hairs in upper part. . . . . 1. *C. brownei*.
  2. Leaves almost glabrous on lower side or with hairs very short and inconspicuous. Calyx minutely hairy, appearing almost glabrous, except under a strong lens. . . . . 2. *C. jamaicensis*.
1. Inflorescence globose.
  3. Hairs on upper side of mature leaf without conspicuously broadened bases. Peduncles mostly axillary. Calyx lobes acute, without linear appendages. . . . . 3. *C. linnaei*.
  3. Hairs on upper side of mature leaf mostly with broadened and often swollen bases. Peduncles terminal or internodal. Calyx lobes elongated into linear appendages 1.5–6 mm. long.
    4. Calyx (exclusive of appendages 5–6 mm. long) about 5 mm. long. Leaves ovate to very broadly ovate. Peduncle with rusty brown hairs. Corolla about 9 mm. long. . . . . 4. *C. clarendonensis*.
    4. Calyx (exclusive of appendages 1.5–2.5 mm. long) 4 mm. long. Leaves lanceolate to ovate, mostly narrowly ovate. Peduncle with whitish hairs. Corolla 4–6 mm. long.



5. Mature leaves rigid, thick, the lower side usually with deep depressions between the veins; hairs on the upper side with raised swollen bases. . . . . 5. *C. bullata*.
5. Mature leaves thinner, the lower side normally flat and without depressions between the veins; hairs on the upper side without raised swollen bases. . . . . 6. *C. globosa* var. *humilis*.

1. ***Cordia brownei*** (Friesen) I. M. Johnston, Jour. Arnold Arb. 31: 177. 1950; Stearn, Proc. Linn. Soc. London 170: 142. 1959.

*Mountjolya Brownei* Friesen, Bull. Soc. Bot. Genève II. 24: 180. 1933.

**Jamaica.** Parishes of ST. CATHERINE, ST. ANDREW and KINGSTON, PORTLAND, ST. THOMAS; also on GRAND CAYMAN. For map of Jamaican distribution, see Stearn (op. cit.).

2. ***Cordia jamaicensis*** I. M. Johnston, Jour. Arnold Arb. 31: 179. 1950; Stearn, Proc. Linn. Soc. London 170: 142. 1959.

**Jamaica.** Parishes of ST. JAMES, ST. ELIZABETH, TRELAWNY, MANCHESTER, ST. ANN, CLARENDON; for map of distribution see Stearn, loc. cit.

3. ***Cordia linnaei*** Stearn, sp. nov.

FIGURE 3.

*Ulmi angustifoliae facie Baccifera Jamaicensis foliis superne scabris, subtus villosis, floribus flavis perpusillis, fructu botryoide monospermo* Plukenet, Almag. Bot. 393. 1696; Phytogr. 4: t. 328, f. 5. 1696.

*Lantana corymbosa* L. Sp. Pl. 2: 628. 1753, p.p. quoad synonym. Plukenetii, non *C. corymbosa* (Desv.) G. Don, 1837.

*Varronia lineata* L. Syst. Nat. ed. 10. 916. [May-June] 1759, p.p. synonym. *Brownei* excluso, *nomen illegit.*; L. Pl. Jam. Pug. (sist. Elmgren) 9. [Nov.] 1759; reimpr. in Amoen. Acad. 5: 394. 1760.

*Cordia lineata* (L.) Roemer & Schultes, Syst. Veg. 4. 464. 1819, *nomen illegit.*; I. M. Johnson, Jour. Arnold Arb. 30: 91. 1949.

*Frutex* 1.5–3 mm. high. *Ramuli* graciles brunneoli, juniores pilis densis erectis fulvis 0.3 mm. longis hispiduli, vetustiores pilis albidis, basibus prominentibus petiolorum foliolorum delapsorum munita. *Folia* breviter petiolata, dissita; lamina lanceolata, apice longe acuminata, margine sparse leviterque acute serrata praecipue supra medium, basi cuneata vel rotundiusculum leviterque acute serrata praecipue supra medium, basi cuneata vel rotundiusculum, 2.5–10 cm. longa, 0.8–3.5 cm. lata, nervis utroque latere costae 4 data, subtus parum prominulis curvatisque sub angulo 20°–40° abeuntibus, supra setis brevissimis et setis ad 0.4 mm. longis basi haud bulboso-inflatis intermixtis appressis asperula, subtus dense vel moderate pubescens; petioli 1–3 mm. longi. *Inflorescentiae* plerumque axillares; pedunculus simplex, 1–4 cm. longus, pilis densis patentibus ad 0.3 mm. longis hispidulus, quam folium subtentum multo brevior, basi petioli parte brevi persistenti articulo adnatus, capitulo solitario globoso 3–12-floro, 4–7 mm. lato terminali adnatus, calyx cupularis, 2.5–3 mm. longus, pilis brevibus appressis vestitus, leniter lobatus, lobis 0.5 mm. longis mucronatis. *Corolla* anguste tubulosa, ca. 3–4 mm. longa, ore 1.5 mm. diametro, alba, intus sparse villosa, limbo





FIGURE 3. *Cordia linnaei* Stearn, holotype (BM), Proctor 15789.



parum expanso vix 1 mm. longo. *Stamina* ca. 2 mm. supra basin corollae inserta; filamenta ca. 1 mm. longa; antherae ca. 0.5 mm. longae semi-exsertae. *Fructus* ca. 3 mm. longus, in vivo ruber, calyce aucto maximam partem velatus.

Type: Jamaica: ST. ANDREW, pastures behind Hope Gardens, 600–700 ft. 22. x. 1956, *Proctor 15789* (BM, holotype; IJ, isotype).

Jamaica. Parishes of ST. ELIZABETH (*Britton 694*); MANCHESTER (*Harris 9434*); CLARENDON (*Proctor 16714*); ST. CATHERINE (*Proctor 7815*), ST. MARY (*Proctor 20606*); ST. ANDREW and KINGSTON (*Adams 5479*, *Alexander 555*; *Powell 748*; *Proctor 15789*, *18265*; *Yuncker 17767*); PORTLAND (*Fredholm 3271*), and ST. THOMAS (*Britton 3618*; *Proctor 5535*, *7425*).

For records outside Jamaica, for Cuba, Hispaniola, Mexico, and Central America to Venezuela, see Johnston, loc. cit. 91. 1949.

The seemingly paradoxical act of describing as new a species which has been known since the 17th century, but which nevertheless lacks a legitimate name, is intended to cut through the nomenclatural tangle and make a fresh start by associating a new name with a modern type specimen of known provenance. Johnston began his account of what he called *Cordia lineata* by referring to it as "a very well marked but previously unrecognized species here associated with a neglected specific name long ago proposed by Linnaeus. The plant is known only from Mexico, Central America and the northern West Indies and is to be found in herbaria mistakenly identified as *C. ulmifolia*, *C. corymbosa* or *C. polycephala*." Reluctant to give this a new name, Johnston resuscitated a very old one, which unfortunately is illegitimate.

The species concerned was known to Leonard Plukenet (1641–1706) and Patrick Browne (ca. 1720–1790) and from 1758 onwards to Carl Linnaeus (1707–1778), who had, however, seen no specimen when he drafted the account of *Lantana corymbosa* for the *Species Plantarum* 2: 628. 1753:

*corymbosa* 6. LANTANA foliis alternis, floribus corymbosis.†  
Periclymenum rectum, salviae foliis majoribus oblongis mucronatis subtus villosis alternatim sitis, flore & fructu minoribus. *Sloan. jam. 104. hist. 2. p. 83. t. 194. f. 3. Raj. dendr. 30.*  
Ulmi angustifoliae facie baccifera jamaicensis, foliis superne scabris, subtus villosis alternatim sitis, floribus parvis perpusillis, fructu botryoide monospermo. *Pluk. alm. 393. t. 329. f. 5.*

*Habitat in Jamaica.*

*Refertur ex fide Sloanei; De floris structura nulla mihi certitudo.*

Here confusion begins. This account is entirely based on the illustrated works of Sloane and Plukenet, and fortunately the specimens from which their illustrations were made are preserved in the British Museum (Natural History). The original of Sloane's illustration, drawn by Everard Kickius



in April 1701, is in Herb. Sloane (vol. 6, fol. 86) and belongs to the species later named *Cordia polycephala* (Lam.) I. M. Johnston. The original of Plukenet's illustration is also in Herb. Sloane (vol. 102, fol. 132) and belongs to the species named *C. linnaei* above and called *C. lineata* by Johnston. Since Sloane's illustration shows a corymbose inflorescence and Linnaeus states that his own entry had been inserted through the testimony of Sloane — *refertur ex fide Sloanei* — Sloane's illustration (op. cit. t. 194, f. 3. 1714) must be taken as the lectotype of *V. corymbosa*. However, the Linnaean epithet *corymbosa* cannot now be legitimately transferred to *Cordia*; its use is barred by *C. corymbosa* (Desv.) G. Don (1837) based on *Varronia corymbosa* Desvaux (1809); the earlier *C. corymbosa* Willd. ex Roemer & Schultes (1819) was published as a synonym and therefore is not valid.

In 1756 Patrick Browne published his *Civil and Natural History of Jamaica*. He was well acquainted with Linnaeus's works and adopted his methods except for the new binomial nomenclature. Here Browne defined on p. 172 a genus *Varronia*, now regarded as congeneric with *Cordia*, including two species. Under the first species, his *Varronia fruticosa foliis rugosis ovatis subhirsutis serratis alternis, capitulis subrotundis*, he cited as a synonym Linnaeus's *Lantana foliis alternis floribus corymbosis*, i.e. *L. corymbosa* L. (1753), and Sloane's *Periclymenum rectum* etc., i.e. its lectotype, although the plant figured (t. 13, f. 2) and described by him is that now called *Cordia globosa* var. *humilis* (Jacq.) I. M. Johnston. Linnaeus accepted Browne's genus *Varronia* in his *Systema Naturae*, ed. 10. 2: 916. 1759, his account being as follows:

VARRONIA. Cal. denticulatis recurvatis. Drupa nucleo 4-loculari.

*lineata*. A. V. fol. lanceolatis lineatis, spicis oblongis. Lantana corymbosa *Spec. pl.* 628. *Brown. jam. t.* 13. f. 2.

*bullata*. B. V. fol. ovatis venoso-rugosis, spicis globosis. *Sloan. jam. t.* 195. f. I.

To be noted in this generic diagnosis is the phrase "Cal. denticulatis recurvatis": this refers to the recurved calyx lobes characteristic of *V. globosa*, mentioned by Browne as having "limbus in quinque lacinias tenuissimas longas reflexas vel intortas divisas" and shown in his figure. They are lacking in the species described above as *C. linnaei*.

The Linnaean epithet *lineata* used here under *Varronia* is an illegitimate substitute for *corymbosa* used earlier under *Lantana*, even though its application embraced a third species (*C. globosa* var. *humilis*), and accordingly it has the same type.

Later, in November 1759, Elmgren defended a Linnaean dissertation, *Plantarum Jamaicensium Pugillus*, intended to amplify the meager references to Jamaican plants in the *Systema Naturae*, using Patrick Browne's specimens which Linnaeus had bought in 1758. This dissertation gives, under the name *Varronia lineata*, a detailed description of the plant described above as *C. linnaei*, which is represented in Linnaeus's herbarium by specimen 255.1 (IDC. Microfiche no. 143), but no reference to Pluke-



net's figure. Actually Patrick Browne had collected three species, i.e. *C. linnaei*, *C. bullata*, and *C. globosa* var. *humilis*.

In the second edition (1762) of the *Species Plantarum* Linnaeus completely altered the earlier concept which he had called *Lantana corymbosa*. This now became *Varronia lineata*, with the original *C. corymbosa* as a synonym but with a new diagnosis, a citation of Plukenet's figure and a citation of the Elmgren dissertation. Thereby, in Johnston's opinion, Linnaeus restricted the application of the epithet *lineata* to the species here called *C. linnaei* but he did not in so doing make the illegitimate epithet *lineata* legitimate. Johnston accepted Plukenet's plate (not Sloane's) as typifying both *Lantana corymbosa* and *Varronia lineata* and he adopted the name *Cordia lineata* published by Roemer and Schultes in 1819.

Since the species concerned (*C. linnaei*) had no legitimate name under *Cordia* in 1819, Roemer and Schultes's use of the name *Cordia lineata* might be regarded as publication of a new name starting from 1819 instead of a new combination based on an illegitimate name of 1759. Unfortunately they cited as synonyms *Varronia humilis* Jacq. and *V. polycephala* Lam., which provided epithets they could have adopted at that time in accordance with their taxonomy although in fact these epithets relate to different species; consequently their name *C. lineata* is also illegitimate.

The next possible name seemed to be *Cordia adnata* DC., Prodrum 9: 493. 1845, based on a specimen of uncertain origin. However, a photograph of the type in the Prodrum Herbarium at Geneva shows a plant with several-headed peduncles, as well as slightly larger heads and less acuminate leaves than *C. linnaei*, agreeing in habit with specimens of *C. polycephala* from Puerto Rico.

Since Johnston's "*Cordia lineata*," therefore, appears to have no legitimate name I have accordingly named it *C. linnaei* both to maintain it in the same alphabetical sequence and to recall the references to it in the works of Carl Linnaeus.

#### 4. *Cordia clarendonensis* (Britton) Stearn, comb. nov.

*Varronia clarendonensis* Britton, Bull. Torrey Bot. Club 41: 16. 1914; Friesen, Bull. Soc. Bot. Genève II. 24: 155. 1933.

Jamaica. Parish of CLARENDON, at Peckham Woods, 760 m., where Harris (no. 10995) collected it in July, 1911.

#### 5. *Cordia bullata* (L.) Roemer & Schultes, Syst. Veg. 4: 462. 1819;

I. M. Johnston, Jour. Arnold Arb. 30: 96. 1949.

*Periclymenum rectum*, *salviae folio rugoso majore, subrotundo, bullata* Sloane

Cat. Pl. Jam. 163. 1696; Voy. Jam. 2: t. 195, f. 1. 1725.

*Varronia bullata* L. Syst. Nat. ed. 10. 2: 916. [June] 1759; L. Fl. Jam. Pub.

(sist. Elmgren) 9 (Nov. 1759); reimpr. in Amoen. Acad. 5: 394. 1760.

Jamaica. Parishes of ST. JAMES, TRELAWNY, ST. ELIZABETH, MAN-



CHESTER, CLARENDON, ST. ANN, ST. CATHERINE, KINGSTON and ST. ANDREW, ST. THOMAS.

6. *Cordia globosa* (Jacq.) Kunth, Nova Gen. 3: 76. 1818.  
 Var. *humilis* (Jacq.) I. M. Johnston, Jour. Arnold Arb. 30: 98, 116. 1949.

*Periclymenum rectum*, *salviae folio rugoso minore bullato, flore albo* Sloane, Cat. Pl. Jam. 163. 1696; Voy. Jam. 2: 81. t. 194. f. 2. 1725.

*Varronia fruticosa foliis rugosis ovatis subhirsutis serratis alternis, capitulis subrotundis* Browne, Hist. Jam. 172. t. 13, f. 2. 1756.

*Varronia humilis* Jacq. Enum. Pl. Carib. 14. 1760; Select. Stirp. Amer. 41. 1763.

*Cordia humilis* (Jacq.) G. Don, Gen. Syst. Garden. Bot. 4: 383. 1837.

Florida, Cuba, Cayman Islands, Jamaica (all parishes), Hispaniola, Mexico, Guatemala, Salvador, Nicaragua, Panama.

*Cordia globosa* is a widely ranging species of which the nomenclatural type probably came from the lesser Antilles; the name *C. globosa* var. *globosa* is accordingly used for the southern geographical race distinguished by Johnston and stated to range over the lesser Antilles, Venezuela, and Brazil.

#### TOURNEFORTIA

*Tournefortia astrotricha* DC. Prodr. 9: 520. 1845; Griseb., Fl. Brit. W. Ind. Isl. 483. 186.

Var. *astrotricha*.

*Tournefortia astrotricha* was described by De Candolle from a specimen collected in 1821 by Carlo Giuseppe Bertero (1789–1831) in Jamaica, probably on the Long Mountain west of Kingston. It has relatively large leaves, up to 20 cm. long and 11 cm. broad, densely hirsute below with curved hairs spreading in all directions and sometimes appearing stellately arranged, whence the epithet *astrotricha*, as indicated by De Candolle's description of the leaves "subtus pube conferta stellatim disposita sericeo-tomentosis pallidis."

It grows in dry rocky places along the southern coast of Jamaica in the parishes of ST. THOMAS (*Adams* 5493); ST. ANDREW and KINGSTON (*Harris* 8930; *Graham* 8047; *Campbell* 6413; *Stearn* 832; *Webster & Wilson* 4851; *Webster et al.* 8374; *Yuncker* 17,750); ST. CATHERINE (*Britton & Hollick* 1833; *Harris* 9330); CLARENDON (*Lewis & van der Porten* 3134; *Lewis* 2447; *Howard* 12002); and MANCHESTER (*Proctor* 27539). It reappears in the Cayman Islands on GRAND CAYMAN (*Kings G.C.* 155; *Kings G.C.* 343; *Proctor* 11999, 15041).

In St. Elizabeth and on the northwest coast in Hanover and St. James a very similar plant to *Tournefortia astrotricha* occurs which has relatively few hairs on the lower leaf surface. Before visiting Jamaica, I had de-



scribed this (though not published it) as a new species confined to the vicinity of Montego Bay. Specific rank now seems too high for it.

Var. *subglabra* Stearn, var. nov.

Folia subglabra, subtus pilis sparsis brevibus plusminusve appressis munita.

Shrub of straggling sparse habit up to 5 m. (15 ft.) high; branchlets stout, those of current year sparsely pubescent, of previous year glabrous and prominently bossed with leaf-scars, later furrowed. *Leaves* short-stalked; blade narrowly ovate to narrowly elliptic, the apex acute, the margin entire, the base narrowly cuneate, 2.5–20 cm. long, 1.5–8 cm. broad, both sides glabrous except for a few scattered curved appressed hairs, the primary veins in 7 to 9 pairs; petiole 0.5–1 cm. long. *Inflorescence* several times branched, many flowered, sparsely pubescent with short more or less appressed hairs, the ultimate branches 4–20 cm. long. *Calyx* about 2.2–5 mm. long, green; segments lanceolate, sparsely pubescent. *Corolla* scented; tube green, glabrous in the lower half, minutely strigose in the upper half, about 4–6 mm. long; limb 5-parted, about 3–4 mm. across, white becoming reddish, with the segments suborbicular, about 2 mm. long, 2–4 mm. broad. *Anthers* about 1.2 mm. long, inserted about 2.2–2.5 mm. above the base of the corolla tube. *Gynoecium* about 2.5–3 mm. long; stigma about 1 mm. broad, mounted on an evident style about 1.5 mm. long. *Fruits* subglobose, in the dried state about 4 mm. long and broad, when fresh to 7 mm. long and 9 mm. broad, white, not blotched.

**Jamaica.** HANOVER or ST. JAMES: Montego Bay to Round Hill Bluff, 25. iii. 1908, *Harris 10351* (BM, K, isotypes; NY, holotype). Near the mouth of Great River, west of Montego Bay, sea-level, 30. iii. 1920, *Maxon & Killip 1431* (NY). HANOVER: Orange Point, 100 ft., 7. iv. 1963, *Proctor 23475* (BM). ST. ELIZABETH: Great Pedro Bluff, 50 ft. 11. v. 1956, *Stearn 1029* (A; BM).

GRAND CAYMAN: near Beach Club Hotel, West Bay Road, Georgetown, 8. vi. 1967, *Brunt 2080* (BM).

Probably the Grand Cayman plant collected by Brunt has been independently evolved from *T. astrotricha* var. *astrotricha* there, and not directly derived from the western Jamaican population.

*Tournefortia astrotricha* belongs to a group of species with rather large leaves, i.e. on flowering shoots at least 8 cm. long and 3.5 cm. broad and sometimes up to 30 cm. long and 8 cm. broad, and suborbicular or oblong corolla lobes about as long as broad. The Jamaican species, i.e. *T. astrotricha* DC., *T. bicolor* Swartz, *T. hirsutissima* L. and *T. staminea* Griseb., may be distinguished as follows:

1. Anthers with their tips protruding from the mouth of the corolla. .... *T. staminea*.
1. Anthers completely enclosed within the corolla tube, their tips not protruding.
2. Stigma almost or quite sessile on the ovary.



- 3. Hairs of corolla 6–8 mm. long, very abundant. Leaves very hairy. .... *T. hirsutissima*.
- 3. Hairs of corolla 4 mm. or less long, fewer. Leaves almost or quite glabrous. .... *T. bicolor*.
- 2. Stigma mounted on an evident style or prolongation of the ovary 1–1.5 mm. long. .... *T. astrotricha*.
- 4. Leaves densely hairy beneath. .... var. *astrotricha*.
- 4. Leaves very sparsely hairy beneath. .... var. *subglabra*.

These taxa have distinctive ranges (FIGURE 1 C and D). Thus *Tournefortia astrotricha* is exclusively coastal, while *T. staminea* inhabits the western upland and montane region at 800 ft. (240 m.) to 1600 ft. (480 m.) in the parishes of Hanover, Westmoreland, St. James, and Trelawny, and *T. bicolor* the eastern region at 1000 ft. (300 m.) to 3500 ft. (1060 m.) in the parishes of St. Mary, St. Andrew, Portland, and St. Thomas. The “chiggernut,” *T. hirsutissima*, probably occurs in every parish and ranges from sea-level to 700 m.

## SOLANACEAE

### SOLANUM\*

*Solanum americanum* Miller, Gard. Dict. ed. 8, art. *Solanum* no. 5. 1768.

Var. *nodiflorum* (Jacq.) Edmonds, comb. et stat. nov.

*Solanum nodiflorum* Jacq. Coll. Bot. 2: 288. 1789; Icon. Pl. Rar. 2: t. 326. 1789.

Revision of the South American taxa of *Solanum* L. sect. SOLANUM (§ *Maurella* Nees, § *Morella* (Dunal) Bitter) typified by *S. nigrum* L. has made apparent the need to reduce to synonymy very many specific names proposed for members of this complex group. I regard *S. americanum* Miller and *S. nodiflorum* Jacquin as conspecific. Early authors placed them in *S. nigrum* L., sensu lato, which breaks up, however, into a number of taxa, distinguishable on correlated morphological and cytological features, which can be reasonably treated as species. The name *S. nigrum* can then be restricted to a hexaploid taxon (with  $2n = 72$ ) while the name *S. americanum* is used for a diploid taxon (with  $2n = 24$ ). *S. americanum* as here interpreted is represented in the eastern half of South America, including the whole of Brazil, by glabrescent plants and in the western half by finely pubescent plants. Miller described his *S. americanum* from plants cultivated in the Chelsea Physic Garden and said to have been introduced from Virginia. The cultivated specimen from Miller’s herbarium in the British Museum (Natural History), London, agrees with his description as far as it goes and is finely pubescent. Jacquin described and illustrated *S. nodiflorum* from plants cultivated at Vienna and stated to have been introduced from Mauritius. This species is represented by

\* By Jennifer M. Edmonds.



a specimen from Jacquin cultivated in Vienna, now in the British Museum (Natural History) which is glabrescent; Professor G. T. S. Baylis recorded (in Trans. Roy. Soc. New Zealand 85: 381. 1958) the mean diameter of the pollen (mounted in lactophenol blue) of this specimen as  $23\mu$ . The two types agree in all essential floral and vegetative features. Accordingly the name *S. americanum* has, on grounds of priority, to be adopted as the earliest specific name available for plants of the diploid group within the *S. nigrum* complex hitherto distinguished as *S. nodiflorum*. Jamaican specimens, being glabrescent, belong to var. *nodiflorum*.

The differences separating *Solanum americanum* from *S. nigrum*, sensu stricto, are collectively significant. Thus *S. americanum* has smaller flowers with the corolla 5–9 mm. across and anthers ca. 1–2 mm. long, erect fruiting pedicels, glossy globose berries 5–7 mm. wide with constantly well reflexed sepals and smaller seeds (only 1–1.5 mm. long), as well as smaller pollen grains associated with its diploid state. *S. nigrum* has larger flowers with the corolla 10–18 mm. across and anthers (1.5–)2.7 mm. long, dull black or green ovoid berries 6–10 mm. wide with the sepals often appressed to them or else moderately reflexed, and larger seeds (1.7–2.4 mm. long).

The mean diameters of pollen grains of Jamaican species of *S. americanum* var. *nodiflorum* collected by Stearn, measured by Baylis after mounting in lactophenol blue and recorded on the sheets (BM) are Stearn 113,  $23.0\mu$  (21.5–23.7 $\mu$ ), 181,  $24.3\mu$  (23.7–25.8 $\mu$ ), 271,  $22.1\mu$  (21.5–23.7 $\mu$ ), 330,  $23.4\mu$  (21.5–23.7 $\mu$ ), 365,  $24.1\mu$  (21.5–28.0 $\mu$ ), 432,  $19.8\mu$  (19.4–21.5 $\mu$ ), 483,  $21.3\mu$  (19.4–21.5 $\mu$ ), 584,  $23.9\mu$  (23.7–25.8 $\mu$ ). The anthers on these specimens vary from 1.0 to 1.7 mm. but are mostly 1.5 mm. long. These measurements fit in with Baylis's finding in New Zealand material of *nodiflorum* a mean pollen diameter of  $21\mu$  and a range of 20–27 $\mu$ . Baylis found the range of pollen diameter in *S. nigrum*, similarly mounted in lactophenol blue, to be 27–38 $\mu$ .

### SCROPHULARIACEAE

*Alectra fluminensis* (Vell.) Stearn, comb. nov.

*Pedicularis melampyroides* Richard, Actes Soc. Hist. Nat. Paris 1: 111. 1792.

*Scrophularia fluminensis* Vellozo, Fl. Flumin. 263. 1825; Fl. Flumin. Ic. 6: t. 87. 1831.

*Alectra brasiliensis* Benth. in DC. Prodr. 10: 339. 1846; Griseb. Fl. Brit. W. Ind. Isl. 429. 1862; J. A. Schmidt in Mart. Fl. Bras. 8(1): 273. t. 47. 1862.

*Alectra melampyroides* (Rich.) Kuntze, Rev. Gen. Pl. 2: 458. 1891; Melchior, Notizbl. Bot. Gart. Berlin 15: 435. 1941, non *A. melampyroides* Benth. 1846.

*Melasma brasiliense* (Benth.) Chodat & Hassler, Bull. Herb. Boiss. II. 4: 291. 1904.

*Melasma melampyroides* (Rich.) Pennell ex Britton & Wilson, Sci. Surv. Porto Rico Virgin Is. 6: 188. 1925; R. E. D. Baker in Fl. Trinidad & Tobago 2: 285. 1954.

This species has long been known from Puerto Rico, the Lesser Antilles, and Trinidad and is apparently widespread in northern South America



(Guyana, Venezuela, Brazil, Paraguay) but was first found in Jamaica, in Hanover parish on Dolphin Head, in 1960 by Dennis Adams (*no.* 8641) and later in Westmoreland parish at Seedy Pond, southeast of Mount Grace, in 1966 by George Proctor (*no.* 27703). Vellozo's epithet *fluminensis* refers to Rio de Janeiro (*Flumen Januarii*), Brazil.

Although *Melasma* Bergius (1767) and *Alectra* Thunb. (1784) have from time to time been treated as congeneric, H. Melchior in his papers, "Beitrag zur Kenntniss der Gattung *Melasma*" (Notizbl. Bot. Gart. Berlin 15: 119–127. 1940) and "Die Gattung *Alectra* Thunb." (loc. cit. 423–447. 1941), has provided reason to keep them apart.

## ACANTHACEAE

### JUSTICIA

The definition of the genus *Justicia* L. and the typification of its name provide interlocked problems of taxonomy and nomenclature for which every possible solution is certain to cause nomenclatural disturbance. As commonly accepted, e.g. by E. C. Leonard (Contr. U. S. Natl. Herb. 31: 487–645. 1958), R. W. Long (Jour. Arnold Arb. 51: 302–309. 1970) and the authors of most Floras, *Justicia* includes some 300 species found in both the Old World and the New, especially in South America, and manifests great diversity in habit, inflorescence, corolla, anthers, and pollen. Emphasis on this diversity led C. G. D. Nees von Esenbeck (1776–1858), who possessed an extraordinarily wide and detailed knowledge of the *Acanthaceae*, to divide the group into smaller genera such as *Adhatoda*, *Amphiscopia*, *Beloperone*, *Gendarussa*, *Leptostachya*, *Orthotactus*, *Rhaphidospora*, *Rhytiglossa*, and *Rostellularia*, most of which have been merged again in *Justicia* by other authors. Nees knew nothing about the markedly different types of pollen within the family which Radlkofer and Lindau later emphasized and used taxonomically; nevertheless many of his groups were restored to generic status by Bremekamp (e.g. in Verhandl. Kon. Nederl. Akad. Wet. Natuurk. II. 45(2): 43–61. 1948) after diligently studying their pollen. Bremekamp's work indicates the lines along which *Justicia*, *sensu lato*, could be divided; it covers, however, relatively few species. Moreover logical application of his concepts to them all, a vast and difficult task, would result in almost every species now called a *Justicia* being called something else. Accordingly, until correlations between differences in inflorescence, floral characters, pollen, and seeds have been established throughout its range and relatively homogeneous natural groups have consequently been defined, the simplest course is to maintain *Justicia* as a large genus while recognizing the possibility of its later dismemberment and the revival of names now buried in its synonymy. This avoids or at least postpones the awkward consequences of typification, associated with narrow generic concepts which become evident on examining its history.

The name *Justicia* was first used by Linnaeus in 1737 (Genera Plan-



tarum 4, no. 12). His heading reads "JUSTICIA *Houst.* A. A. *Adhatoda Tournef.* 79. *Ecbolium Riv.* 1. 129." The cryptic "*Houst.* A. A." refers to an intended publication on new genera by William Houstoun (1695–1733). Made acquainted with Houstoun's manuscript and drawings by Philip Miller, Linnaeus expected this would form part of the *Philosophical Transactions* of the Royal Society of London, the title of which he latinized as *Acta Anglica* and then abbreviated to "A. A.," but Houstoun's work was not published until 1781, after the death of all concerned, by Sir Joseph Banks under the title *Reliquiae Houstounianae*. Houstoun based his genus *Justicia* on American species now placed in the genus *Dicliptera*. Linnaeus took from him only the name *Justicia* commemorating Houstoun's fellow countryman James Justice (d. 1762 or '63), Clerk of the Sessions at Edinburgh. He based his own generic description in the *Genera Plantarum* on the Asiatic species later named *Justicia adhatoda* L. (*Adhatoda zeylanica* Med.), merely substituting the name *Justicia* for Paul Hermann's *Adhatoda* used by Tournefort (*Inst. Rei Herb.* 175. t. 79. 1700), because this was derived from the Tamil vernacular name "Adathodai," Sinhalese "Adathoda," meaning "goat not touch," in allusion to its bitter leaves, and Linnaeus rejected such *nomina Barbara*. His reference "Riv. 1. 129" is to a plate under the name *Ecbolium* in Rivinus, *Icones Plantarum, quae sunt Florae irregulari monopetalo* (1690), which illustrates *Justicia adhatoda* received from Paul Hermann (cf. Rivinus, *Introd.* 16. 1690). The same generic description was repeated in the fifth edition of the *Genera Plantarum* (10. no. 26. 1754) with added details of the pistil. The historic type of *Justicia* L. is thus *J. adhatoda* and Britton in 1918 (*Fl. Bermuda* 54) designated this as its lectotype, thereby making *Justicia*, sensu stricto, equivalent to *Adhatoda* Miller.

In the *Species Plantarum* (1753) Linnaeus expanded his concept of the genus *Justicia* to include ten other species, although he did not emend his generic description in the *Genera Plantarum* (1754) to fit them. Indeed these species differ so much among themselves that later authors have put them in different genera as indicated below.

1. *J. Adhatoda*: later *Adhatoda zeylanica* Medicus, 1790; *A. vasica* Nees, 1832.
2. *J. Ecbolium*: later *Ecbolium viride* (Forsk.) Alston; *E. linneanum* Kurz, 1871.
3. *J. Betonica*: later *Adhatoda betonica* (L.) Nees, 1832.
4. *J. hyssopifolia*: later *Gendarussa hyssopifolia* (L.) Webb & Berth., 1845.
5. *J. procumbens*: later *Rostellularia procumbens* (L.) Nees, 1847.
6. *J. repens*: later *Rungia repens* (L.) Nees, 1832.
7. *J. chinensis*: later *Dicliptera chinensis* (L.) Juss., 1807.
8. *J. echiodides*: later *Andrographis echiodides* (L.) Nees, 1832.
9. *J. sexangularis*: later *Dicliptera sexangularis* (L.) Kurz, 1870.
10. *J. nasuta*: later *Rhinacanthus nasutus* (L.) Kurz, 1870.
11. *J. purpurea*: later *Hypoestes purpurea* (L.) Solander ex Roem. & Schultes, 1817.

Of these species only 1 (*adhatoda*), 4 (*hyssopifolia*), and 9 (*sexangularis*) were known to Linnaeus when preparing his *Hortus Cliffortianus* (1738);



he became acquainted with 2 (*Ecbolium*), 3 (*Betonica*), 5 (*procumbens*), 6 (*repens*), and 8 (*echioides*) when preparing his *Flora Zeylanica* (1747) and with 7 (*chinensis*), 10 (*nasuta*), and 11 (*purpurea*) when preparing his *Species Plantarum* (1753). Linnaeus's generic description excludes 9 (*sexangularis*). Unfortunately 1 (*Adhatoda*) belongs to a little group often separated generically, as *Adhatoda* Miller, from *Justicia* as commonly interpreted.

Acceptance, following Britton, of *Justicia adhatoda* as lectotype of *Justicia* means that for those botanists who also maintain this generic separation, accepted reluctantly by H. Heine (Fl. Gabon 13: 173. 1966) but described by him as artificial, disputable, and based on a character of feeble taxonomic value, all but about 10 of the 300 or so species now in *Justicia* must be placed under other generic names.

Hitchcock and Green proposed in 1929 (Int. Bot. Congr., Cambridge, Nom. Prop. Brit. Bot. 116) the acceptance as standard-species (lectotype) of "*J. hyssopifolia*, the best known of the four species now retained in the genus." However, this does not accord well with most species currently placed in *Justicia* either. *J. hyssopifolia* is a remarkable shrubby Canarian species, on which Webb & Berthelot based their *Gendarussa* subgenus DIPSAS; this and a few allied African species could well form a separate genus if one adopted narrow generic concepts in the group. The consequence would again be the transfer of most of the species now in *Justicia* into other genera, but in the absence of any available subdivision of *Justicia*, sensu lato, into acceptable groups no one would know where else to put them. Bremekamp, in 1948 proposed the restriction of *Justicia* to *J. hyssopifolia* and its close allies, used the Linnaean name *Dianthera* for a small group of American species, the names *Beloperone* Nees, *Psacado-calymma* Bremek. (a synonym of *Stethoma* Raf.) and *Calliaspidia* Bremek. (a synonym of *Drejerella* Lindau) for a few others, and noted that *J. carthaginensis* and its allies would then have to be transferred to a genus of their own as yet unnamed, but he necessarily left the major world-covering problems almost untouched since he was primarily concerned with the Acanthaceae of Java.

It is indeed comparatively easy to arrange the *Justicia* species of a limited area into natural groups equivalent to accepted genera, but how universally valid are the distinctions thus made on a regional basis? If narrow generic concepts are adopted in this group, none of the American species belongs to *Justicia*, sensu stricto; then, for example, the 71 species described from Colombia by Leonard would be of uncertain generic allocation, and the same applies to most African and Asiatic species currently included in *Justicia*.

Maintenance of *Justicia* as a large genus means, however, that *Beloperone* and *Drejerella* cannot logically be excluded from it. Lindau founded his genus *Drejerella* in 1900 (Urban, Symb. Antill. 2: 222) to include three West Indian species, *D. mirabilioides* (*Justicia mirabilioides* Lam.),



*D. nemorosa* (*J. nemorosa* Swartz) and *D. origanoides* (*Adhatoda origanoides* Nees, *J. origanoides* (Nees) Griseb. non Vahl) and two Mexican species, *D. virgata* (*Drejera virgata* Oerstedt) and *D. fulvicoma* (*Justicia fulvicoma* Schlecht.). He placed it in a group of genera with "Spangpollen," i.e. with 3-pored pollen grains having each pore flanked by a narrow raised longitudinal band. *Justicia*, *Jacobinia*, and *Beloperone* formed a separate group with "Knötchenpollen," having the pores flanked on each side not by a simple raised band defined by the pore-furrow (colpus) and an outer furrow (pseudocolpus), but by one to three longitudinal rows of low protuberances or raised dots (insulae), one row in *Justicia*, two in *Beloperone*, two or three in *Jacobinia*. These distinctions need amendment, if accepted at all. *Drejerella* is indeed a natural group with large overlapping bracts and 3-pored pollen but, although in *D. origanoides* and in *D. tomentosula* Urban the band or ridge on each side of the pore is entire, in *D. blechoides* Lindau, *D. fulvicoma* (*Beloperone pringlei* S. Watson), *D. guttata* (Brandeg.) Bremek. and *D. mirabilioides*, lectotype of *Drejerella*, it is replaced by a single row of 9 to 12 protuberances. The type species of *Beloperone* Nees, *B. brasiliana* (Roth) Bremek. (*B. amherstiae* Nees), has 2-pored pollen, with two or three rows of 8 to 10 protuberances each side of the pore. Similar 2-pored pollen with two rows of protuberances each side of the pore occurs in *Justicia carthaginensis* Jacq. and *J. eustachiana* Jacq. (placed in *Beloperone* by Lindau). The two possible lectotypes for *Justicia*, as explained above, *J. adhatoda* and *J. hyssopifolia*, both have 2-pored pollen. In *J. adhatoda* there is a faint row of protuberances each side of the pore, in *J. hyssopifolia* an entire band. A possible separation simply on the number of pores, i.e. two pores in *Justicia* (including *Adhatoda*, *Beloperone*, *Dianthera*, and *Stethoma*), three in *Drejerella* (including *Calliaspidia*) would, however, merely produce two artificial assemblages so heterogeneous in other characters as to need further subdivision, for which not enough information is available at present. Three-pored pollen occurs in the Asiatic *Justicia betonica*, *J. gendarussa* Burm. f., and *J. ventricosa* Hook. and, if *Justicia* is restricted to species with 2-pored pollen, then these should be removed from it, together probably with other Asiatic species not related to the American *Drejerella* species. However, much diversity exists among pollen grains with two pores. In *J. comata*, for example, the pore is flanked either by three protuberances or an almost entire band. The palynology of the group as a whole must certainly have a significant part in its reclassification. Pending that reclassification, *Justicia* is probably best accepted in a broad sense. Its Jamaican representatives may be distinguished as follows:

1. Inflorescence diffuse, with numerous very slender branches. Bracts inconspicuous, not more than 2 mm. long. Corolla less than 1 cm. long. Low-growing herbs. Pollen grains 2-pored, with 3-4 protuberances each side of the pore.
2. Corolla 3-5 mm. long. Inflorescences axillary and terminal; the branches mostly whorled (i.e. 3-7 arising at the same level). . . . . *J. comata*.



2. Corolla 7–9 mm. long. Inflorescences mostly terminal, the lower branches paired or alternate (i.e. arising only 2 together or else singly at different levels). . . . . *J. pectoralis*.
1. Inflorescence short, dense, stout. Bracts conspicuous, overlapping, the lowermost about 1–4 cm. long. Corolla 2.5–4 cm. long. Shrubs or subshrubs.
3. Inflorescences axillary on peduncles 5–10 cm. long. Corolla with distinctly curved upper lip. Pollen grains 2-pored. Naturalized in Jamaica. . . . . *J. adhatoda*.
3. Inflorescences terminal or, if axillary, then peduncle not more than 2 cm. long. Corolla with straight upper lip.
4. Bracts of inflorescence gradually narrowed to the base, oblanceolate. Pollen grains 2-pored. Cultivated in Jamaica. . . . . *J. carthaginensis*.
4. Bracts of inflorescence rounded or broadly cuneate at base, lanceolate, narrowly ovate, elliptic or rotund. Pollen grains 3-pored.
5. Inflorescence drooping or horizontal. Corolla white with red markings on lips. Cultivated in Jamaica. . . . . *J. brandegeana*.
5. Inflorescence erect or ascending. Corolla pink, crimson, or purple.
6. Shoots densely covered with spreading hairs to 2 mm. long. Petioles always very short (4–10 mm. long). . . . *J. jamaicensis*.
6. Shoots almost glabrous or inconspicuously hairy with very short hairs.
7. Leaves acuminate. Bracts lanceolate or narrowly ovate, acute. Corolla to 3 cm. long. . . . . *J. nemorosa*.
7. Leaves obtuse or acute. Bracts rotund to elliptic, rounded or abruptly acute. Corolla 3.5–4 cm. long. . . . *J. blechoides*.

*Justicia adhatoda* L. Sp. Pl. 1: 15. 1753; Lindau in Urban, Symb. Antill. 2: 234. 1900.

*Justicia arborea, foliis lanceolato-ovatis, bracteis ovatis persistentibus, corolla galea concava* L. Fl. Zeyl. 6. 1747.

*Adhatoda zeylanica* Medicus in Hist. Comm. Acad. Theod. Palat. 6. Phys.: 393. 1790.

*Adhatoda vasica* Nees in Wall. Pl. Asiat. Rar. 3: 103. 1832.

A native of India and Ceylon often cultivated in tropical gardens, this is naturalized in Jamaica in the parish of St. Thomas.

*Justicia blechoides* (Lindau) Stearn, comb. nov.

FIGURE 4C.

*Drejerella blechoides* Lindau in Urban, Symb. Antill. 6: 43. 1909.

Jamaica. Parish of TRELAWNY (*Adams* 6735; *Harris* 8958, 9356, 10663; *Proctor* 15755).

*Justicia brandegeana* Wassh. & L. B. Smith in Reitz, Fl. Illustr. Catarin. Acant.: 102. 1969.

*Beloperone guttata* Brandegees in Univ. Calif. Publ. Bot. 4: 278. 1912, non *Justicia guttata* Wall.

*Calliaspidia guttata* (Brandegee) Bremek. in Verh. Kon. Nederl. Akad. Wet. Natuurk. II. 45(2): 54. 1948.

*Drejerella guttata* (Brandegee) Bremek. in Philipp. Jour. Sci. 80: 14. 1952.



A native of Mexico, commonly cultivated under the name "Shrimp plant," this is grown in Jamaica but has not been reported anywhere as naturalized.

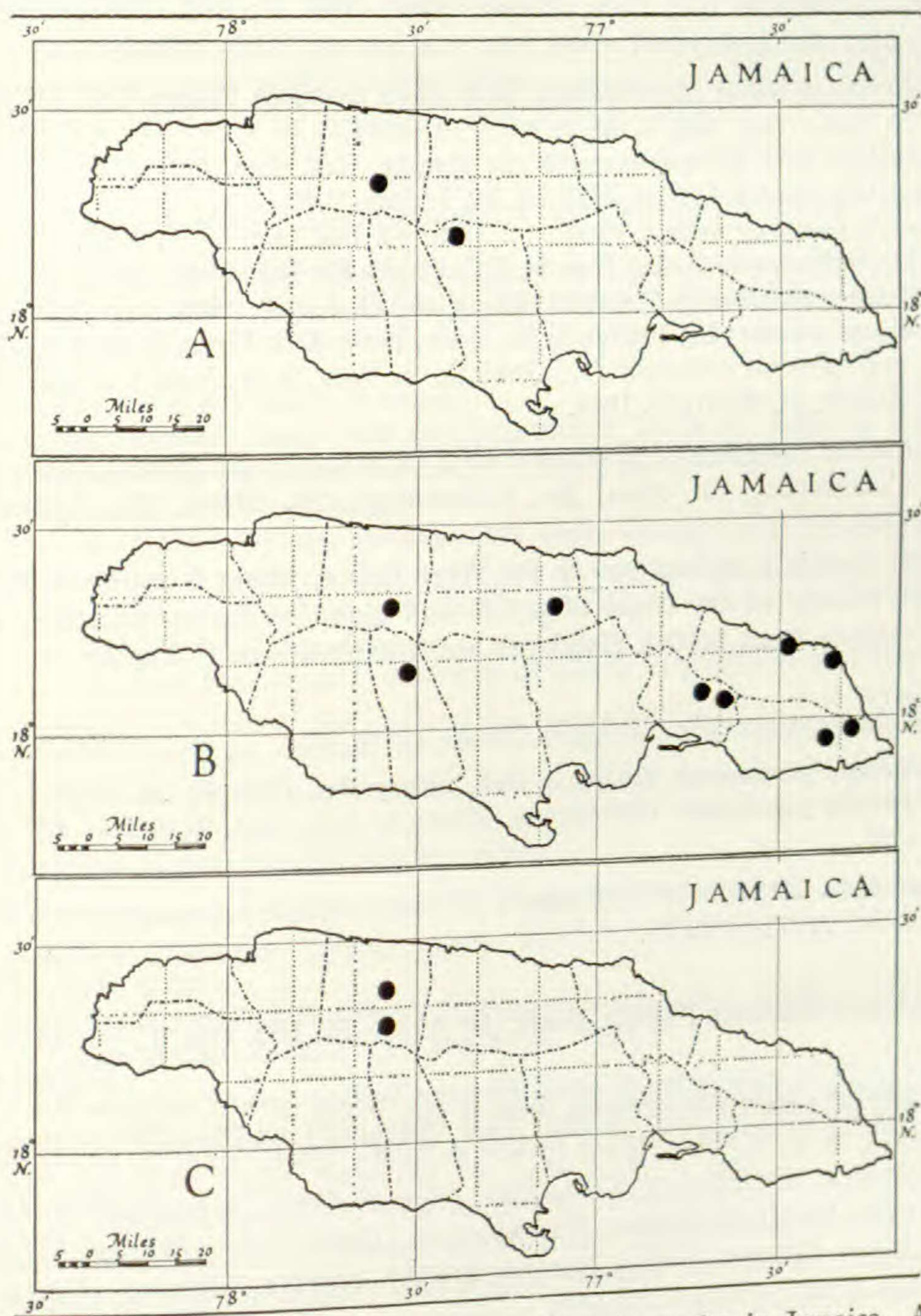


FIGURE 4. Maps showing distribution of *Justicia* species in Jamaica. A. *J. jamaicensis*; B. *J. nemorosa*; C. *J. blechoides*.

*Justicia carthaginensis* Jacq. Enum. Pl. Carib. 11. 1760; Select. Stirp. Am. 5. t. 5. 1763; Lindau in Urban, Symb. Antill. 2: 234. 1900.

*Adhatoda carthaginensis* (Jacq.) Nees in DC. Prodr. 11: 403. 1846.

*Ecbolium carthaginense* (Jacq.) O. Kuntze, Rev. Gen. Pl. 1: 980. 1891.

Recorded in error from Jamaica. Widespread in the West Indies and



Middle America south to Venezuela, its type locality, but known in Jamaica only as a cultivated plant.

**Justicia comata** (L.) Lam. Encycl. Méth. Bot. 1: 632. 1785; Swartz, Obs. Bot. 14. 1791.

*Antirrhinum minus angustifolium*, flore dilute purpureo Sloane, Cat. Pl. Jam. 59. 1696; Voy. Jam. 1: 60. t. 103, f. 2. 1707.

*Dianthera foliis lanceolato-ovatis* etc. Browne, Hist. Jam. 118. 1756.

*Dianthera comata* L. Syst. Nat. ed. 10. 2: 850. 1759.

*Justicia humifusa* Swartz, Prodr. 14. 1788; Fl. Ind. Occ. 1: 35. 1797.

*Leptostachya comata* (L.) Nees in DC. Prodr. 11: 381. 1847.

*Ecbolium comatum* (L.) Kuntze, Rev. Gen. Pl. 1: 487. 1891.

*Stethoma comata* (L.) Britton in Sci. Surv. Porto Rico Virgin Is. 6: 218. 1925.

*Psacadocalymma comatum* (L.) Bremek. in Verh. Kon. Nederl. Akad. Wet. Natuurk. II. 45(2): 55. 1948.

**Jamaica.** Parishes of HANOVER, WESTMORELAND, ST. JAMES, TRELAWNY, CLARENDON, ST. ANN, ST. CATHERINE, ST. MARY, ST. ANDREW, PORTLAND.

This species is widespread in the West Indies, where it grows in moist places, mostly at the edges of ponds and along irrigation trenches, and also extends from British Honduras and Guatemala to Colombia.

**Justicia jamaicensis** (Britton) Stearn, comb. nov. FIGURE 4A.

*Jacobinia?* *jamaicensis* Britton in Bull. Torrey Bot. Club 41: 16. 1914.

*Drejerella jamaicensis* (Britton) S. Moore in Jour. Bot. (London) 65: 221. 1927.

**Jamaica.** Parishes of TRELAWNY (*Proctor* 11051); CLARENDON (*Harris* 10978, 11178, 12783).

**Justicia nemorosa** Swartz, Prodr. 14. 1788; Fl. Ind. Occ. 1: 37. 1797.

FIGURE 4B.

*Beloperone nemorosa* (Swartz) Nees in DC. Prodr. 11: 415. 1847.

*Drejerella nemorosa* (Swartz) Lindau in Urban, Symb. Antill. 2: 223. 1900.

**Jamaica.** Parishes of TRELAWNY (*Powell* 775); MANCHESTER (*Purdie*); ST. ANN (*Alexander*); ST. ANDREW (*Harris* 5650; *Proctor* 23334); PORTLAND (*Bengry* 4851; *Yuncker* 18422), and ST. THOMAS (*Harris & Britton* 10569; *Proctor* 26751).

**Justicia pectoralis** Jacq. Enum. Pl. Carib. 11. 1760; Select. Stirp. Amer. 3. t. 3. 1763.

*Dianthera foliis lanceolatis* etc. Browne, Hist. Jam. 118. 1756.

*Dianthera pectoralis* (Jacq.) Murray in L. Syst. Veg. 164. 1784.

*Stethoma pectoralis* (Jacq.) Raf. Fl. Tellur. 4: 61. 1838.

*Rhytiglossa pectoralis* (Jacq.) Nees in Mart. Fl. Bras. 9: 128. 1847.

*Ecbolium pectorale* (Jacq.) Kuntze, Rev. Gen. Pl. 1: 487. 1891.



*Psacadocalymma pectorale* (Jacq.) Bremek. in Verh. Kon. Nederl. Akad. Wet. Natuurk. II. 45(2): 55. 1948.

**Jamaica.** Parishes of ST. JAMES (*Proctor* 24720) and ST. MARY (*Adams* 12245).

This species which occurs here and there throughout the West Indies and over Central America from Mexico to northern South America, was formerly cultivated in Jamaica as a medicinal plant.

#### CUBAN JUSTICIA SPECIES OF THE DREJERELLA GROUP

In Cuba, following Alain's treatment in Leon & Alain, *Flora de Cuba* 4: 507, 508. 1957, there are five species of the *Drejerella* group distinguishable as follows:

1. Stem uniformly hairy all round. .... *J. tomentosula*.
1. Stem unevenly hairy with two longitudinal bands of dense or long hairs separated by two much less hairy or almost glabrous spaces.
  2. Corolla 8-14 mm. long.
    3. Bracts obovate, narrowed into stalk. Corolla 8-12 mm. long. .... *J. alainii*.
    3. Bracts rhomboid. Corolla 14 mm. long. .... *J. maestrensis*.
  2. Corolla 18-25 mm. long.
    4. Leaf base cuneate. Lower lip of corolla much shorter than tube. .... *J. mirabilioides*.
    4. Leaf base rounded. Lower lip of corolla about equalling tube. .... *J. calcicola*.

#### *Justicia alainii* Stearn, nomen novum.

*Adhatoda origanoides* Nees in DC. Prodr. 11: 407. 1847.

*Justicia origanoides* (Nees) Griseb. Pl. Cub. 197. 1866, non *J. origanoides* Vahl, 1805.

*Drejerella origanoides* (Nees) Lindau in Urban, Symb. Antill. 2: 225. 1900; Alain in Leon & Alain, Fl. Cuba 4: 507. 1957.

An endemic Cuban species recorded from the provinces of Pinar del Rio, Habana, Las Villas, Camagüey, and Oriente and the Isla de Pinos, this was described under *Adhatoda* by Nees from a scrap of a specimen in W. J. Hooker's herbarium collected by his friend and American correspondent Dr. Benjamin D. Greene (1793-1862), first president of the Boston Society of Natural History and a great though unobtrusive benefactor of botany in New England. As noted by Urban (Symb. Antill. 3: 53. 1902) there is no printed record of his visiting Cuba: "wann er in Cuba war, ist nicht bekannt." Neither Asa Gray in 1863 nor T. T. Bouvé in 1880 mentioned such a visit when outlining his career. The type specimen of *Adhatoda origanoides* Nees (κ) is labeled "Havana." A letter of 28 May 1831 from Greene at New York to Hooker (Hooker correspondence 61 no. 122) elucidates this: "About three years ago since I passed a winter in Havana to avoid, on account of my wife's health, the severity of our winter. I there made a small collection of plants of the vicinity and



recollect on my return selecting some with the intention of sending them to you." He added that any West Indian plants he sent "must have been from Cuba," not Bermuda as Hooker supposed. Thus the Havana area is the type locality of *Adhatoda organoides*. Unfortunately Nees's epithet *organoides* cannot be retained under *Justicia* owing to the earlier *J. organoides* Vahl, Enum. Pl. 1: 122. 1805, which is apparently synonymous with *Nelsonia canescens* (Lam.) Sprengel. It has accordingly been renamed in honor of Brother Alain (Dr. E. E. Liogier), formerly of the Colegio de la Salle, Habana, as a tribute to his work on the Cuban flora.

***Justicia calcicola* (Urban) Stearn, comb. nov.**

*Drejerella calcicola* Urban, Symb. Antill. 9: 133. 1928.

Cuba. ORIENTE PROVINCE (*Ekman* 7715).

***Justicia maestrensis* (Urban) Stearn, comb. nov.**

*Drejerella maestrensis* Urban, Symb. Antill. 9: 134. 1928; Alain in Leon & Alain, Fl. Cuba 4: 507. 1957.

Cuba. ORIENTE PROVINCE (*Ekman* 8217).

***Justicia mirabilioides* Lam. Tabl. Encycl. Illustr. Gen. 1: 39. 1791.**

*Beloperone lamarckiana* Nees in DC. Prodr. 11: 415. 1847, nom. illegit.

*Drejerella mirabilioides* (Lam.) Lindau in Urban, Symb. Antill. 2: 222. 1900; Alain in Leon & Alain, Fl. Cuba 4: 508. 1957.

Cuba. (Oriente); Hispaniola, Puerto Rico, St. Thomas, St. Croix, Martinique (probable type-locality).

***Justicia tomentulosa* (Urban) Stearn, comb. nov.**

*Drejerella tomentulosa* Urban, Symb. Antill. 9: 133. 1923; Leon & Alain, Fl. Cuba 4: 508. 1957.

Cuba. ORIENTE PROVINCE (*Ekman* 3264, 7550).

#### OPLONIA

***Oplonia* Raf. Fl. Tellur. 4: 64. 1838.**

FIGURE 5 A, B, C.

*Anthacanthus* Nees in DC. Prodr. 11: 460. 1847; Lindau in Urban, Symb. Antill. 2: 214. 1900.

*Forsythiopsis* Baker in Jour. Linn. Soc. London, Bot. 20: 218. 1883; Benoist in Humbert, Fl. Madag. 182: 106. 1967.

The names *Oplonia* and *Anthacanthus* both have as their type the same West Indian species, *Justicia spinosa* Jacq., and, although Rafinesque's name *Oplonia* has hitherto been ignored, the genus concerned is too small and unimportant to justify conservation of Nees's better known but later name *Anthacanthus*. The problems associated with its definition and geographical distribution have been discussed in "A survey of the tropical



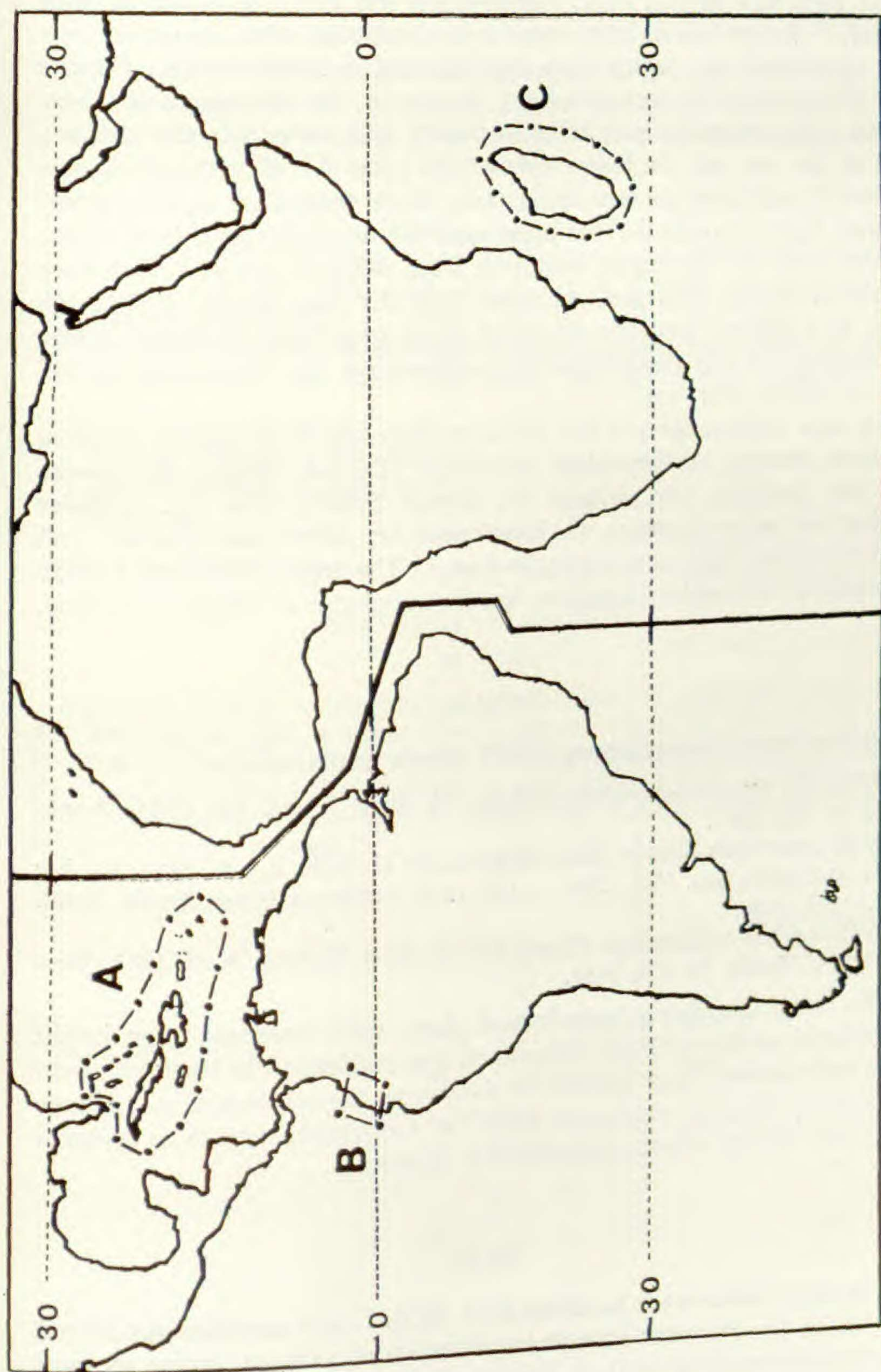


FIGURE 5. Map showing distribution of *Oplonia* and *Psilanthele* (Acanthaceae). A. West Indian species of *Oplonia* (*Anthacanthus*); B. South American species of *Oplonia* and *Psilanthele*; C. Madagascan species of *Oplonia* (*Forsythiopsis*).



genera *Oplonia* and *Psilanthele* (*Acanthaceae*)" in *Bull. Brit. Mus. (Nat. Hist.), Bot.* 4: 259–323. 1971. *Forsythiopsis* was based on a Madagascan species, *F. baroni* Baker, later found to be conspecific with the earlier *Justicia vincoides* Lam., which Nees had included in *Anthacanthus*. Despite their wide geographical separation (cf. FIGURE 5), the American and Madagascan groups resemble each other so closely as to leave only the glabrous style of the one and the hairy style of the other for their morphological separation and their generic distinction. Both groups are heterostylous. It seems highly improbable that these manifold resemblances between them are the result of convergent evolution from different stocks rather than parallel or slightly divergent evolution from the same stock. If it is the latter, as I believe, then this advanced genus must have developed before the breakup of the Gondwanaland landmass in the Cretaceous period over 70 million years ago.

The taxa distinguished in the Jamaican flora are *O. acicularis* (*Justicia acicularis* Swartz, *Anthacanthus acicularis* (Swartz) Nees), *O. armata* with two varieties, var. *armata* (*J. armata* Swartz) and var. *pallidior* (*Psilanthele minor* Lindau), *O. jamaicensis* (*P. jamaicensis* Lindau) and *O. microphylla* (*Justicia microphylla* Lam.). The genus *Psilanthele* Lindau is restricted to Ecuador; Jamaican species included in it belong to *Oplonia*.

## RUELLIA

*Ruellia sceptrum-marianum* (Vell.) Stearn, comb. nov.

*Pedicularis sceptrum-marianum* Vellozo, Fl. Flum. Descr. 269. 1825; Icones 6: t. 104. 1831.

*Ruellia acutangula* Nees in Flora (Regensburg) 21 (Beibl. ii.): 61. 1838; Hooker f. in Curtis's Bot. Mag. 104: t. 6382. 1878; Lindau in Urban, Symb. Antill. 2: 196. 1900.

*Arrhoxylum acutangulum* (Nees) Nees in Mart. Fl. Bras. 9: 58. 1847; Nees in DC. Prodr. 11: 210. 1847.

This is an ornamental large-leaved plant, with numerous large bright red flowers, native to Brazil, introduced into cultivation in England about 1876 and recorded from Jamaica by Lindau on the evidence of a specimen gathered by Hansen, which must have been cultivated; there is no evidence of its ever having become naturalized in Jamaica.

## MAPS

The maps indicate the localities from which I have examined specimens. Thanks to the intensive botanical exploration of Jamaica during the past 30 years, particularly by G. R. Proctor of the Institute of Jamaica, enough material is now available for such maps to give a fairly reliable impression of the ranges of species within the island. Other maps will be found in the following papers.



- STEARN, W. T. 1958. A key to West Indian mangroves. Kew Bull. 1958: 33-37. [*Avicennia germinans*.]
- . 1959. A botanist's random impressions of Jamaica. Proc. Linn. Soc. London 170: 134-147. [*Columnea*, *Cordia*, *Ipomoea*.]
- . 1968. Jamaican and other species of *Bumelia* (Sapotaceae). Jour. Arnold Arb. 49: 280-289. [*Bumelia americana*.]
- . 1969. A synopsis of Jamaican Myrsinaceae. Bull. Brit. Mus. (Nat. Hist.) Bot. 4: 143-178. [*Ardisia*, *Wallenia*, *Myrsine*.]
- . 1969. The Jamaican species of *Columnea* and *Alloplectus* (Gesneriaceae). Bull. Brit. Mus. (Nat. Hist.) Bot. 4: 179-236. [*Columnea*, *Alloplectus*, *Achimenes*.]
- . 1971. A survey of the tropical genera *Oplonia* and *Psilanthele* (Acanthaceae). Bull. Brit. Mus. (Nat. Hist.) Bot. 4: 259-323. [*Oplonia*.]

DEPARTMENT OF BOTANY

BRITISH MUSEUM (NAT. HIST.)

CROMWELL ROAD, LONDON S. W. 7

ENGLAND

## EXPLANATION OF PLATE

### PLATE I

**Forestiera.** A-H, *F. rhamnifolia* var. *pilosa* Stearn: A, staminate inflorescence and underside of leaf; B, upper side of leaf; C, cluster of staminate flowers; D, single staminate flower; E, anther; F, fruiting branch; G, fruits; H, stigma. K, *F. segregata* (Jacq.) Krug & Urban: a, upper side of leaf, b, underside of leaf. [A-E from *Harris 9017*, F-H from *Harris 9056*, K from *Harris 9015*.] Plate drawn by Derrick Erasmus.







# THE LINACEAE IN THE SOUTHEASTERN UNITED STATES<sup>1</sup>

KENNETH R. ROBERTSON

LINACEAE S. F. Gray, Nat. Arr. Brit. Pl. 2: 639. 1821, "Lineae"  
[A. P. de Candolle, Théorie Élem. Bot. 214. 1813, "Linées"],  
nom. cons

(FLAX FAMILY)

Herbs [shrubs, trees or woody climbers] with simple and mostly alternate (rarely all opposite or whorled) leaves; stipules present or absent. Inflorescences various, cymose, racemose, corymbose, or paniculate [rarely solitary]. Flowers perfect, regular, 5[4]-merous; sepals and petals free or slightly connate at the base, the sepals quincuncially imbricate, the petals contorted in aestivation and often clawed; disc absent; stamens equal in number to the petals and alternate with them or twice as numerous and in two whorls, filaments connate at the base with nectar glands usually on the outside of the tube, staminodia sometimes present; ovary superior, syncarpous, 5[2-4]-carpellate, sometimes partially or completely subdivided into 10 [4-8] locules by the intrusion of false septa, ovules 2 per carpel, epitropous; styles as many as the carpels, mostly free or sometimes partly to completely united; stigmas distinct, capitate to sometimes partly to completely united; seeds often with a mucifiliform. Fruit a septicidal capsule [or drupe]; seeds often with a mucifiliform. Fruit a septicidal capsule [or drupe]; seeds often with a mucifiliform. (Linaceae sensu Hutchinson, 1967; Linoideae of Winkler, excluding Nectaropetaleae, and of Scholz.) TYPE GENUS: *Linum* L.

About 13 genera and 275-350 species of worldwide distribution, but with relatively few species in the Southern Hemisphere. Four genera are represented in North America: *Linum*, with about 41 (including 4 or 5

<sup>1</sup> Prepared for a generic flora of the southeastern United States, a joint project of the Arnold Arboretum and the Gray Herbarium of Harvard University made possible through the support of the National Science Foundation (Grant GB-6459X, principal investigator, Carroll E. Wood, Jr.). This treatment follows the format established in the first paper in the series (Jour. Arnold Arb. 39: 296-346. 1958). The area covered includes North and South Carolina, Georgia, Florida, Tennessee, Alabama, Mississippi, Arkansas, and Louisiana. The descriptions are based primarily on the plants in this area, with additional information in brackets. References I have not seen are marked by an asterisk.

I am very grateful to several individuals for their assistance in the preparation of the manuscript: Dr. Wood for his most helpful suggestions and careful editing, Dr. Bernice G. Schubert for thoroughly reading the manuscript, Dr. C. M. Rogers (Wayne State University) for his review and thoughtful comments, and Mrs. Nancy Dunkly for checking the bibliographies and for her accurate typing. The illustration was drawn by Karen Stoutsenberger largely from preserved material collected by Dr. Wood.



introduced) species primarily in the Southwest and on the Atlantic and Gulf coastal plains; *Radiola* J. Hill (*Millegrana* Adanson), with *R. linoides* Roth introduced and established in Nova Scotia; *Hesperolinon* (Gray) Small, with 12 species largely confined to California; and the monotypic *Sclerolinon* C. M. Rogers, with *S. digynum* (Gray) C. M. Rogers ranging from Washington south to California. *Reinwardtia* Dumort. has been introduced into the West Indies from India. These genera, plus the Asian *Anisadenia* Wall. and *Tirpitzia* Hallier f., comprise the tribe Lineae (mostly herbs or subshrubs, stamens the same number as the petals, fruits capsular), which is generally of temperate regions. The tribe Hugonieae Planchon (trees, shrubs or woody climbers, stamens twice the number of the petals, fruits drupaceous) is mostly tropical and contains six genera, including the South American *Hebepetalum* Benth and *Roucheria* Planchon. The family is evidently not indigenous to southern Central America, adjacent northern South America, and most of the West Indies.

Closely related to the Linaceae, or sometimes included within it, are the Humiriaceae, Ctenolophonaceae, Ixonanthaceae, and Erythroxylaceae, which share the simple leaves; regular flowers; diplostemonous androecium or stamens in only 1 whorl, rarely numerous, with the filaments basally united; nectiferous disc absent or small; and superior ovary. The Geraniaceae, Oxalidaceae, Malpighiaceae, Zygophyllaceae, and Polygalaceae are also sometimes considered to be related to the Linaceae. The Linaceae have recently been placed in the Linales (Cronquist), the Geraniales (Winkler, Scholz, Thorne, and Takhtajan), and the Malpighiales (Hutchinson, in his Lignosae). Hallier placed the Linaceae in his Guttates as a derivative of the Ochnaceae and considered it as the evolutionary center of origin for several lines, including the Passiflorales, Myrtales, Sapotales, Santalales, and some families of the Tubiflorae. Airy Shaw suggests that through *Anisadenia* the Linaceae are connected with the Plumbaginaceae, and Erdtman (1969) says that on palynological grounds these two families are close.

The floral anatomy and morphology of *Linum* and certain other genera have been the subject of numerous papers (cf. Sharsmith and Narayana). The stamens in the Lineae are monadelphous, with a cup from which the filaments arise. In some species and genera nonvascularized structures, usually called staminodia, alternate with the stamens. Sharsmith found in *Hesperolinon*, *Radiola*, and a few species of *Linum* that the petals arise from the cup in exactly the same position as the staminodia found in *Linum* and other genera. In other species of *Linum*, and in *Anisadenia* and *Reinwardtia*, the petals originate from the receptacle at the base or from the sides of the cup. In all cases the petals have but a single vascular strand, are only lightly attached to the cup or receptacle, and usually fall readily if disturbed. Collections of members of this family should be made early in the morning and be pressed immediately.

Reported chromosome numbers are *Hugonia* (3 spp.)  $2n = 12, 24, 26$ ; *Radiola linoides*,  $2n = 18$ ; *Reinwardtia trigyna*,  $2n = 20, 22$ ; *Sclerolinon*



*digynum*,  $2n = 16$ ; and *Linum*,  $2n = 12, 16, 18, 20, 24, 26, 28, 30, 32, 34, 36, 52, 54, 60, 62, 68, 72, 84$ .

Pollen grains of the Linaceae are diverse and of some taxonomic importance. The tribe Lineae has 3-, 4- or 6-colpate, pantocolpate, or pantoporate grains with a granular to baculate sexine, while the Hugonieae have mostly tricolporate grains with the sexine usually strongly baculate and often tegillate. The pollen of *Anisadenia pubescens* and *Reinwardtia indica* was reported as nonaperturate by Erdtman, but Saad describes both as pantoporate. Pollen morphology supports the removal of *Ctenolophon* and the Humirioideae from the Linaceae. Pollen of the woody members of the family is of a more advanced type than that of the herbaceous members. Saad and Erdtman have pointed out similarities between the Linaceae, especially *Hugonia*, and the *Plumbago* group of the Plumbaginaceae. Palynological similarities to the Geraniaceae and Oxalidaceae have also been noted.

Anatomical studies indicate that the Linaceae *sensu lato* is not a natural group and its division into several families is warranted. The Linaceae and Erythroxylaceae are considerably different anatomically, while the Linaceae and Humiriaceae have numerous similarities, with the wood of the latter family more primitive than the former and similar to *Ctenolophon*. Within the Linaceae, *Indorouchera* has the most primitive wood. There is no evidence from wood anatomy that the woody members of the family are derived from herbs.

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#### Tribe LINEAE [Eulineae Planchon]

##### 1. *Linum* Linnaeus, Sp. Pl. 1: 277. 1753; Gen. Pl. ed. 5. 135. 1754.

Perennial or annual herbs [or shrubs], sometimes woody at the base, with one or several  $\pm$  erect stems arising from a taproot or rootstock, usually unbranched below the inflorescence, stems mostly glabrous, infrequently scabrous [or pubescent], and often striate. Leaves simple and alternate, sometimes opposite below, infrequently all opposite [or whorled], ovate or obovate to linear, entire, denticulate or glandular toothed, mostly sessile with one midvein or several prominent parallel veins; stipules absent or paired and glandular. Inflorescences terminating the main stems, usually much branched and several to many flowered [rarely solitary], basically cymose but often appearing as scorpioid cymes, panicles, racemes or corymbs. Flowers yellow, blue [white or red]. Sepals 5, free or united at the base, lanceolate to ovate or obovate with acute to long attenuate apices, rarely obtuse,  $\pm$  equal or the inner shorter than the outer, [glabrous or] all or only the inner glandular toothed, sometimes ciliate, with 1 or 3 prominent veins, persistent or infrequently deciduous, quincuncial. Petals 5, free [or connate by the claws], the lower adaxial surfaces pubescent or glabrous, inserted at the base of or on the staminal tube, fugacious, contorted, the claws or adaxial petal appendages small or almost absent. Stamens 5, alternate with the petals, basally united to form a cup around the ovary, nectar glands often on the outside of the cup; nonvascularized staminodia alternating with stamens or absent; anthers introrse, 2-locular at anthesis, opening lengthwise. Stigmas 5, distinct, capitate or clavate [to filiform]; styles 5, free or partly to almost completely united, homostylous [or heterostylous]; ovary superior, syncarpous, 5-carpellate but becoming  $\pm$  10-locular by the intrusion of incomplete to complete false septa, the true septa sometimes ciliate, ovules 2 in each carpel, pendulous,



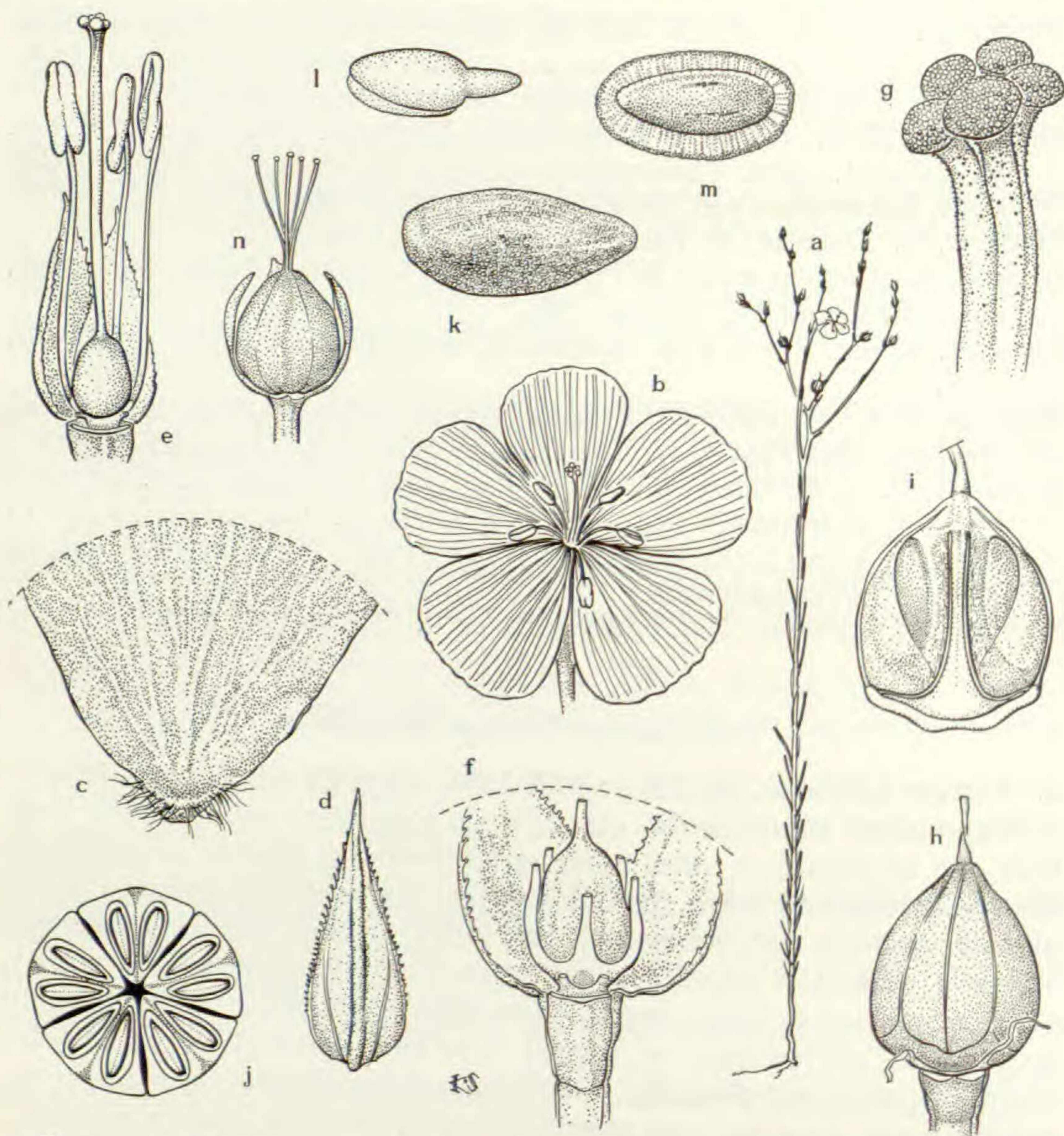


FIGURE 1. *Linum*. a-m, *L. Carteri* var. *Smallii*: a, plant with flower and immature capsules,  $\times 1/4$ ; b, flower,  $\times 2$ ; c, adaxial surface of petal base showing pubescent ligule with small abaxial pouches visible near margins,  $\times 12$ ; d, abaxial surface of outer sepal,  $\times 6$ ; e, flower (petals, three sepals and two stamens removed),  $\times 5$ ; f, flower (petals, three sepals and upper androecium and gynoecium parts removed) to show staminal cup and bases of filaments, two petal attachment points below, and nectar gland between petal attachment points,  $\times 10$ ; g, free capitate stigmas, upper part of style pubescent,  $\times 20$ ; h, capsule with persistent style and filaments (the sepals deciduous) — note basal cartilaginous plate,  $\times 5$ ; i, vertical section of capsule showing complete, partly cartilaginous and partly membranaceous false septa, two seeds visible through membranaceous part,  $\times 6$ ; j, semidiagrammatic cross section of immature capsule showing five 2-seeded segments which dehisce between the false septa (black),  $\times 6$ ; k, seed, surface scalariform,  $\times 10$ ; l, embryo,  $\times 10$ ; m, moistened seed surrounded by striated mucilage,  $\times 6$ . n, *L. floridanum* var. *floridanum*: nearly mature capsule with persistent sepals (two removed) and distinct styles, a cartilaginous plate lacking,  $\times 6$ .

axile, epitropous. Fruit a septicidal capsule, often beaked, dehiscing into 10 one-seeded or 5 two-seeded segments, the latter type with triangular